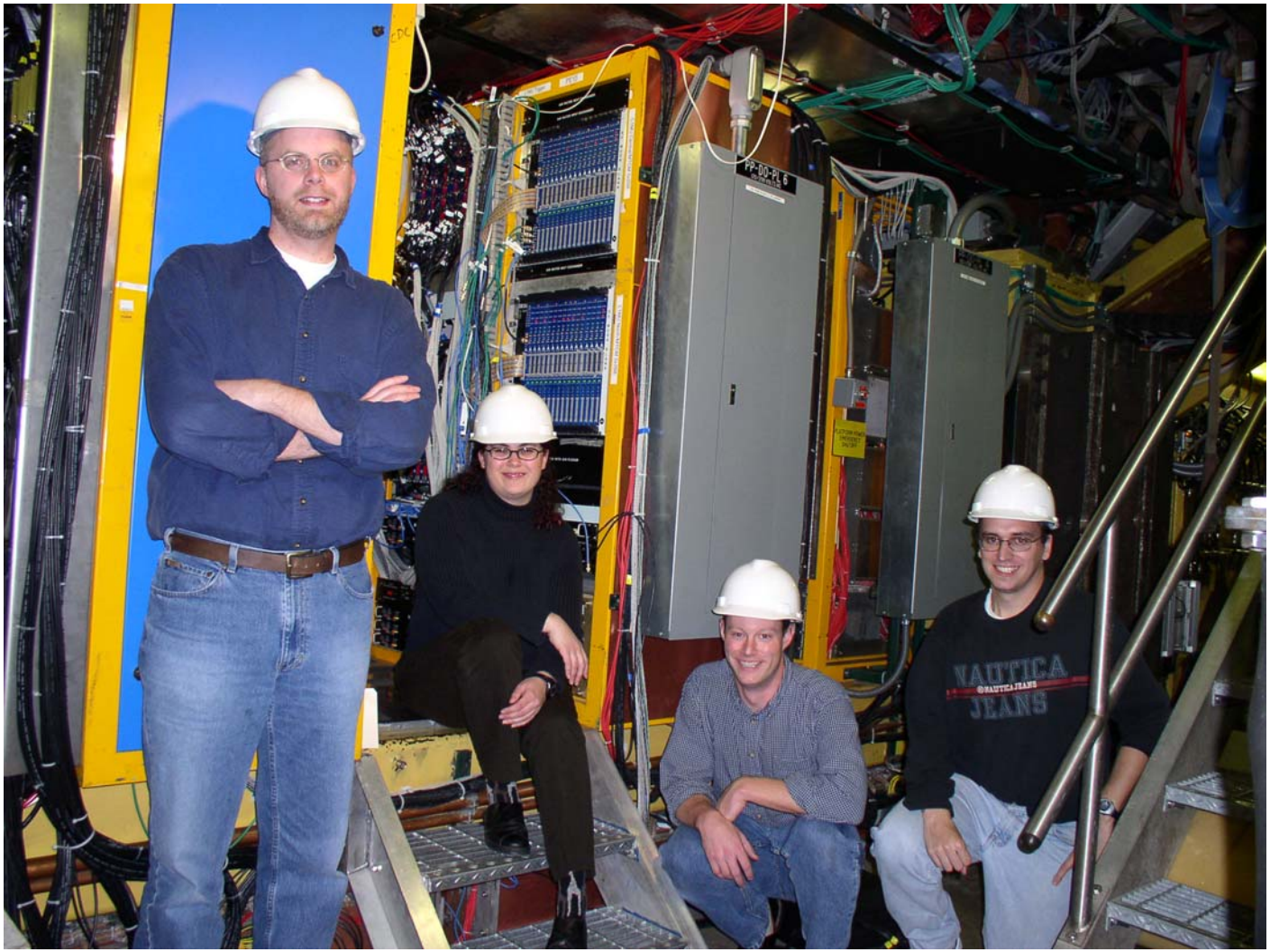
Level 1 Muon Trigger

- Arizona holds primary responsibility for the Run II L1MU trigger hardware and software
  - Hardware
    - Certification
    - Day-to-day operations, monitoring, and maintenance
    - Trouble-shooting (sometimes the entire muon system)
    - Support for L1CTT and FPD
  - Software
    - L1MU trigger simulator and certification
    - Online control and monitoring ("Examine")
    - Offline "reconstruction" of L1MU data
    - Data analysis (e.g. efficiency, purity, optimization)
- These tasks are fundamentally important ones for DØ (and a full-time job)

Arizona L1MU Crew



L1MU Trigger in the Collision Hall

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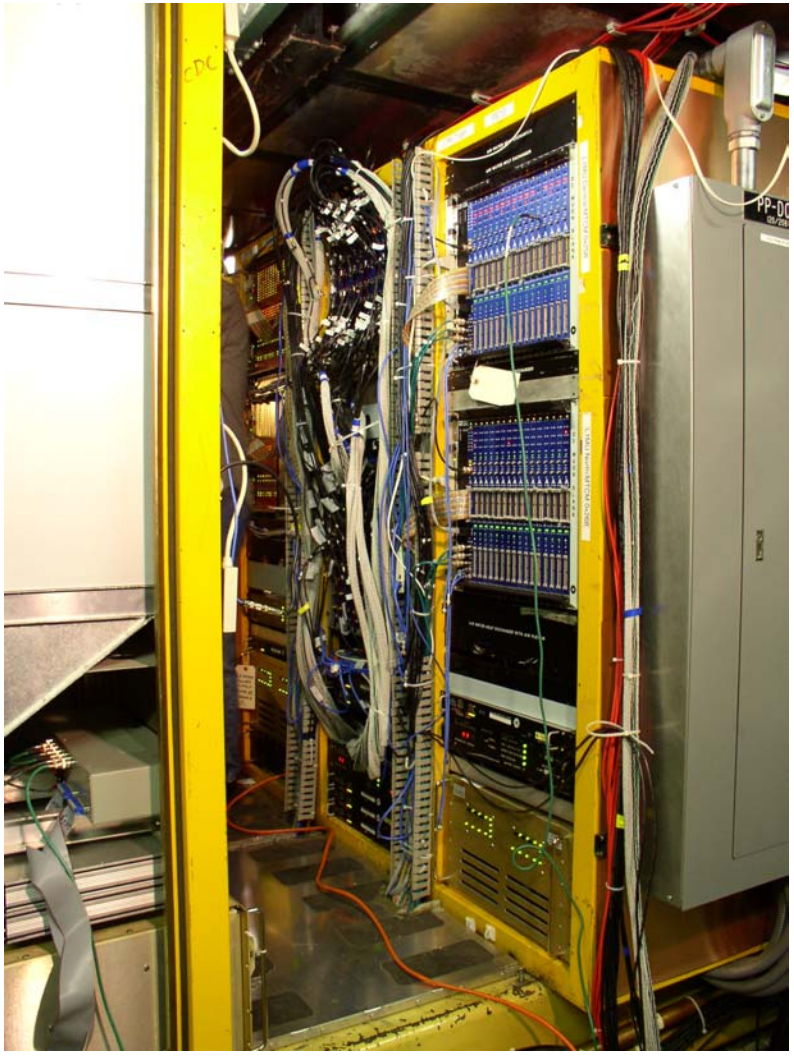
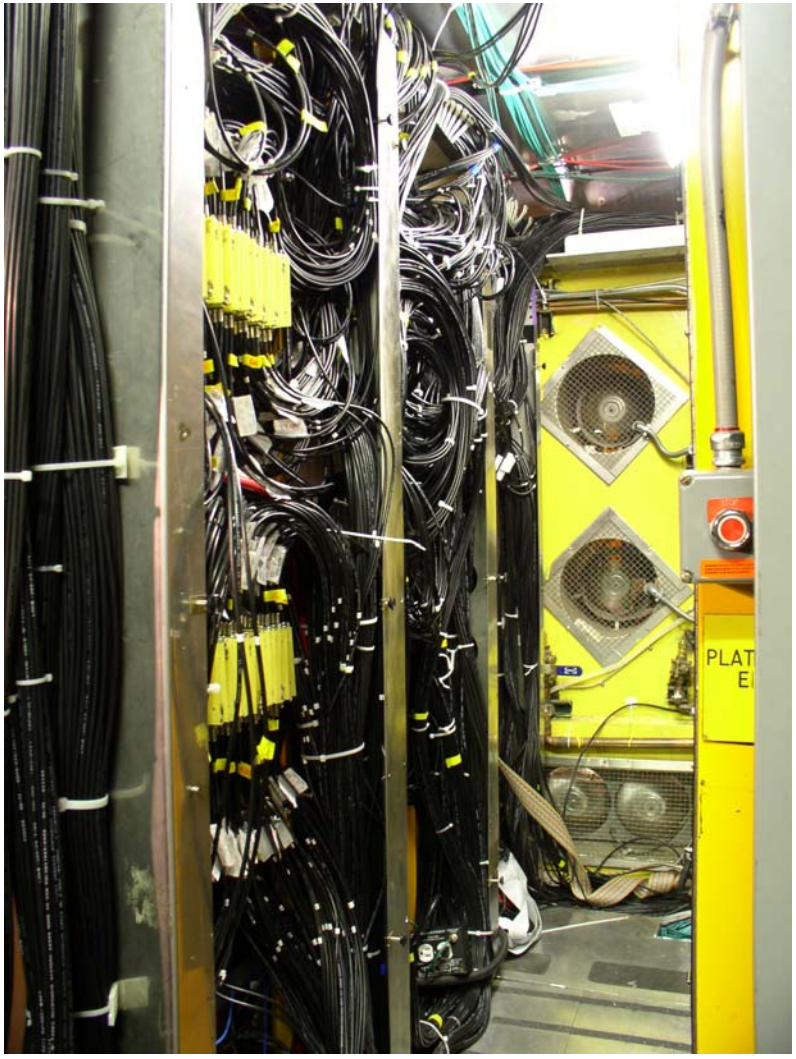
L1MU Trigger in the Collision Hall





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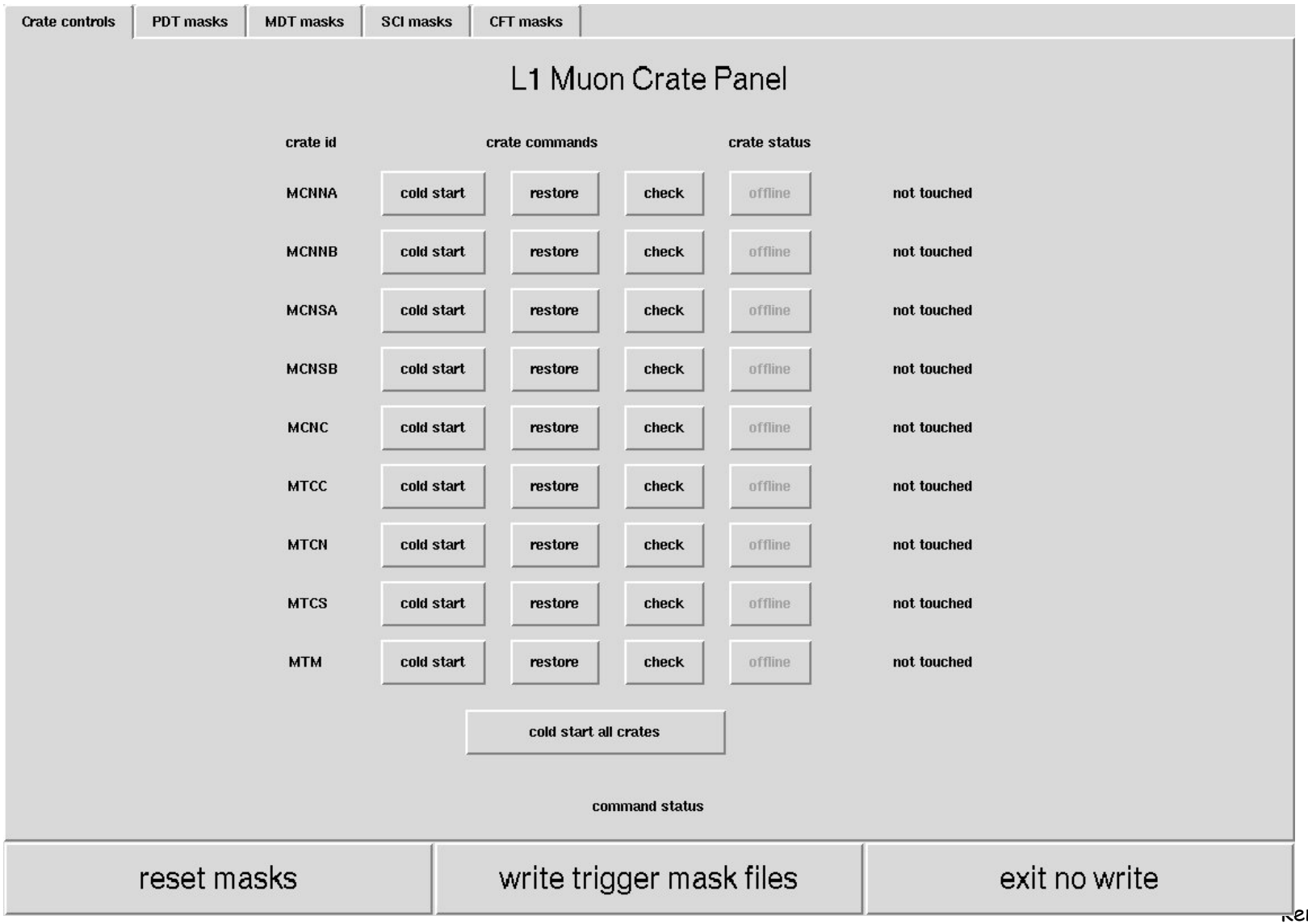
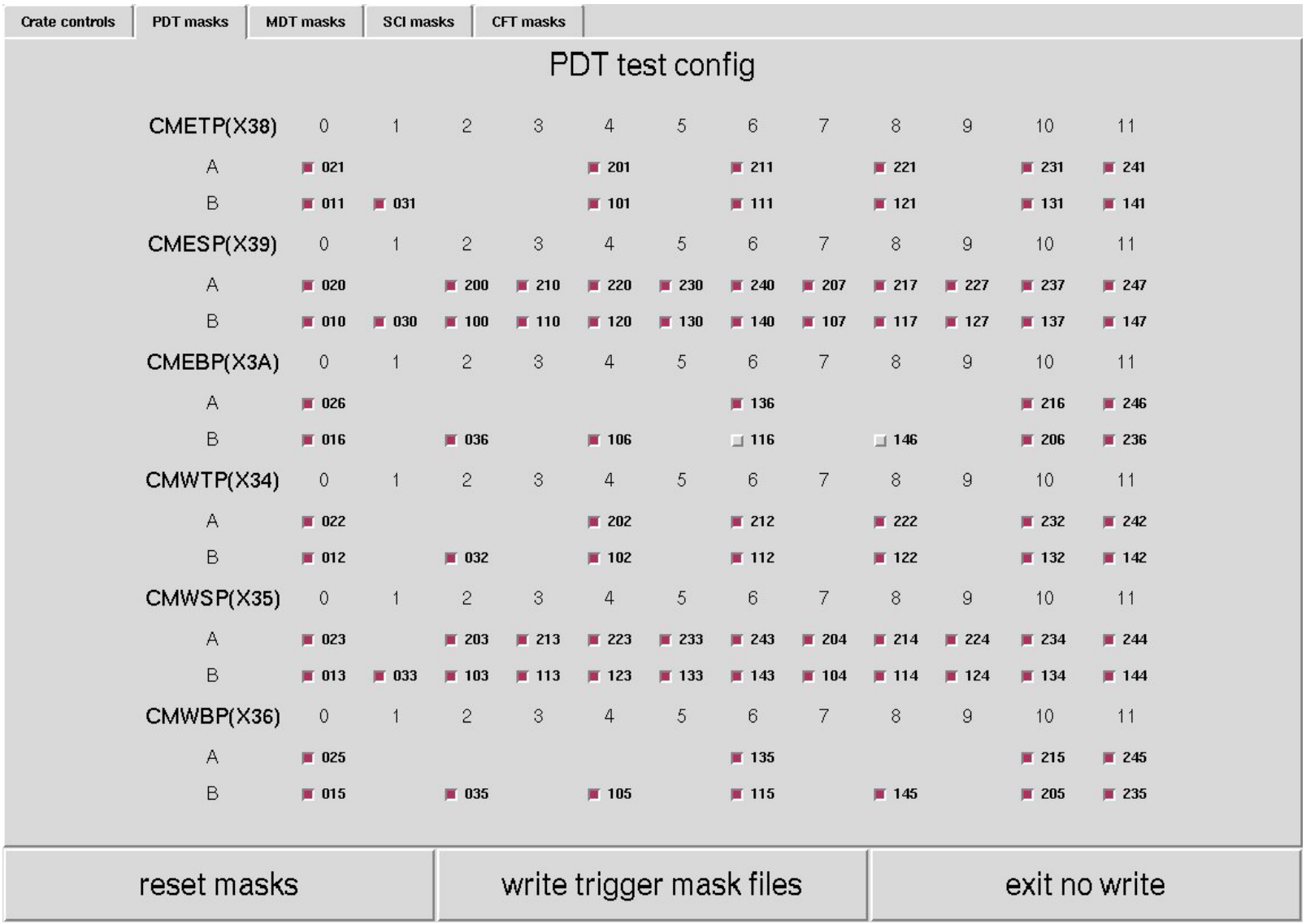
Shifter GUI (Crate Reload)



Shifter GUI (PDT Mask)



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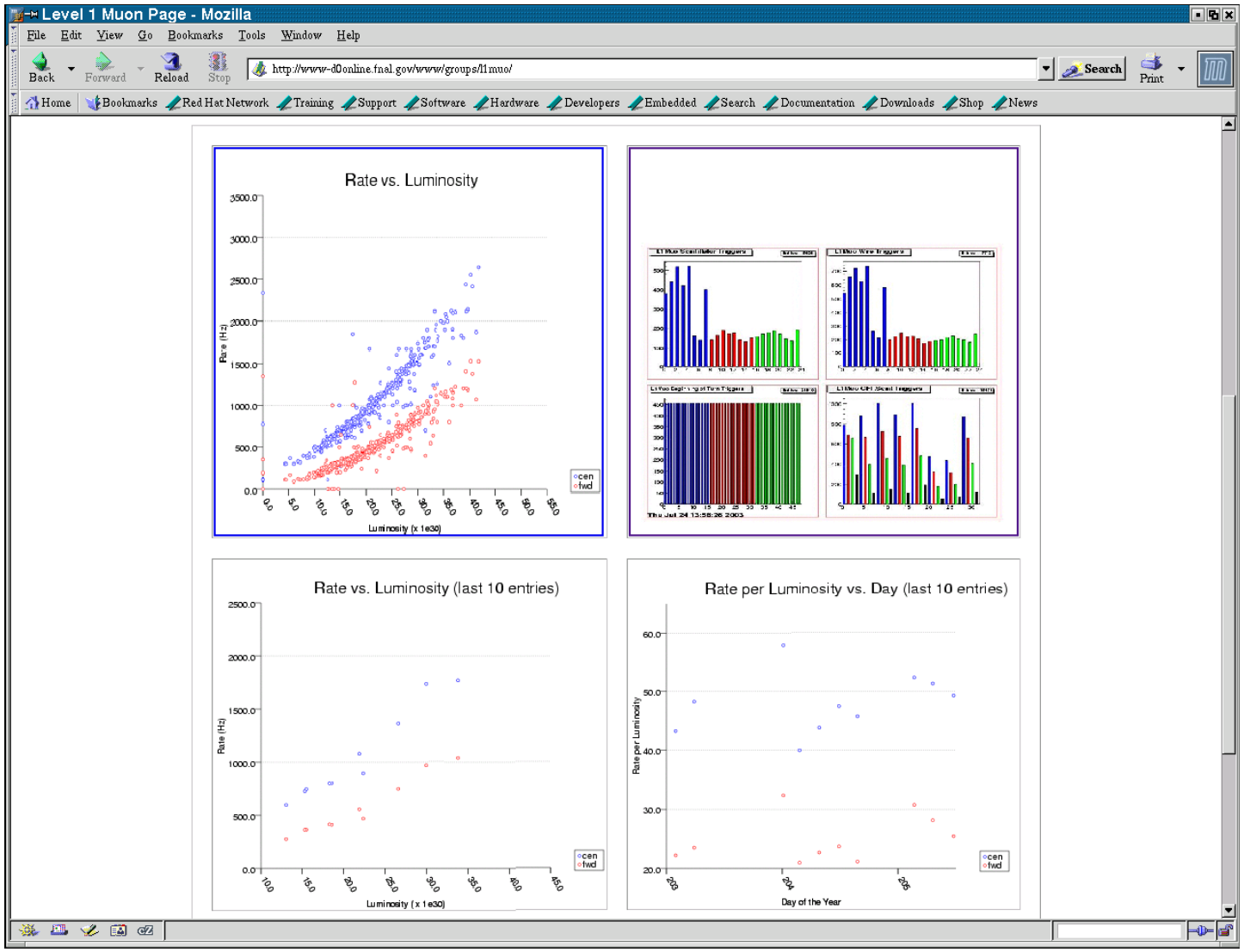
L1MU WWW Online Page



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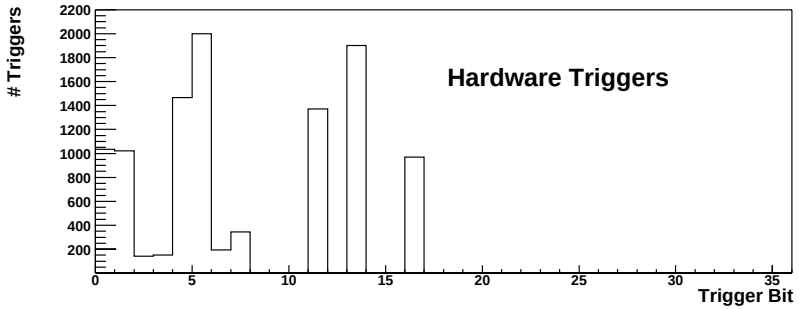
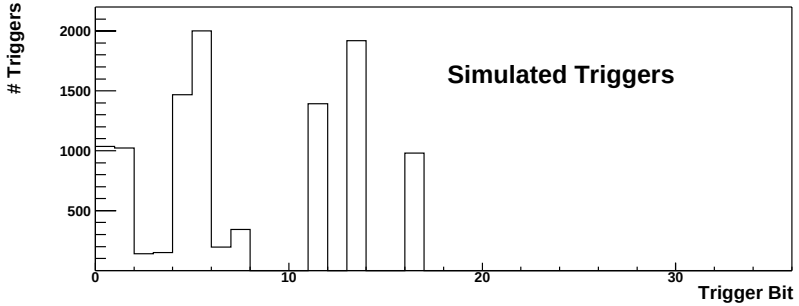
L1MU Certification

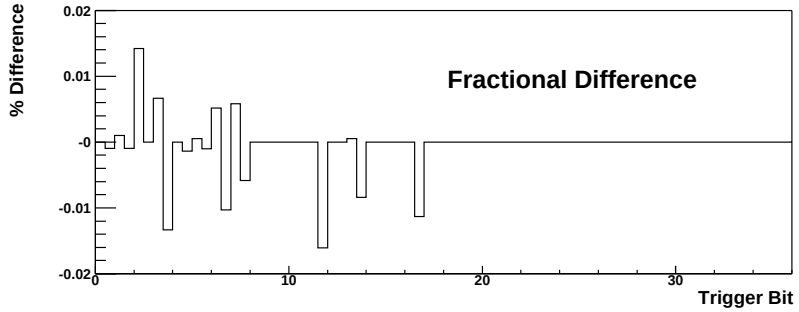
- Triggers found by L1MU hardware



- Triggers found by L1MU simulator

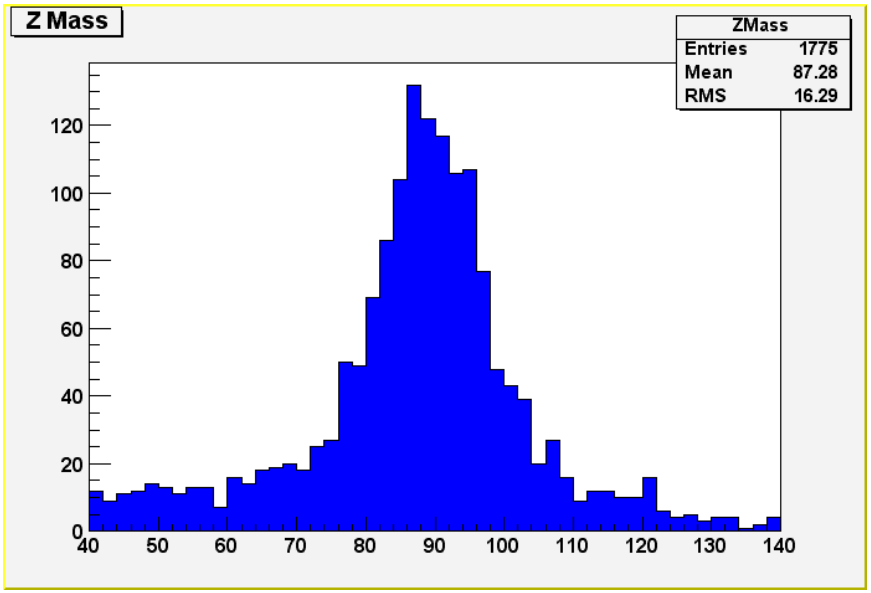


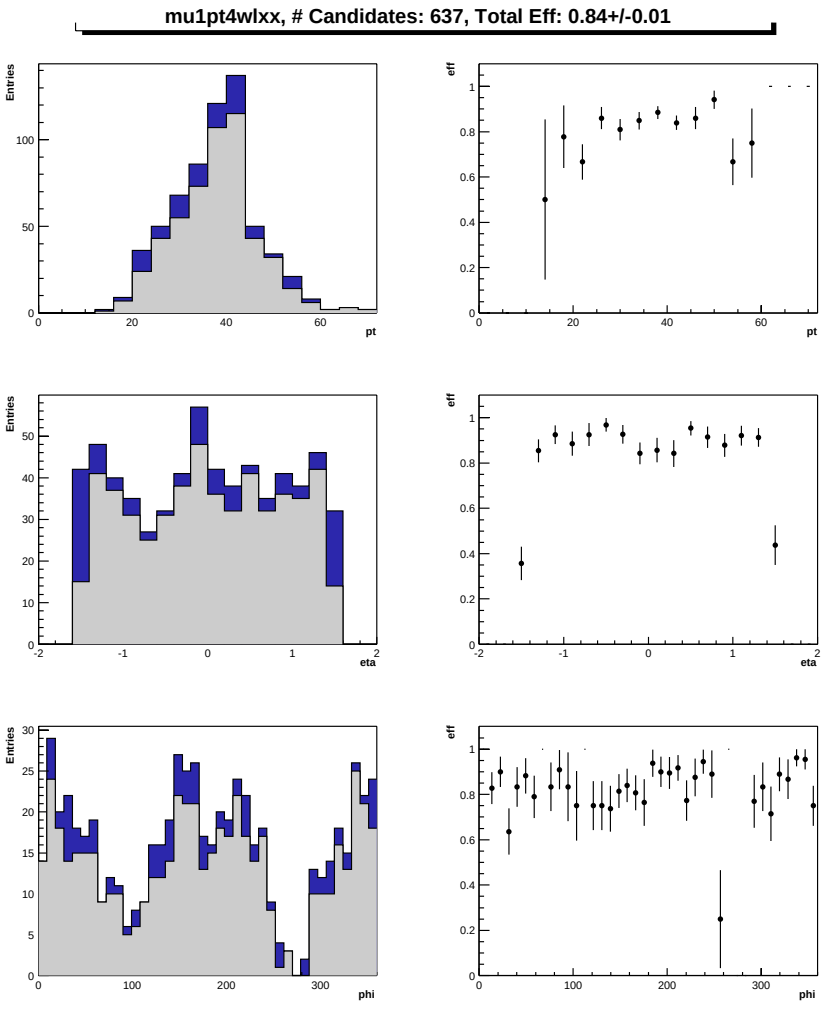
- Fractional difference



L1MU Trigger Efficiencies from Data

MU1PT4WLXX efficiency
wrt medium muons= 0.84





And we have results for many other L1MU efficiencies

New Slides from RCM

Updates

- Hardware
  - Spurious parity errors from receivers fixed fall 03
    - Quick detection of bad inputs/cables from new GUI
  - MTCxx synch problem fixed? Fall 04
    - Reliable readout of input data
    - Used to verify mapping of ~300 PDT FEB-CB cables during fall 04 shutdown
- Power Supplies
  - All PS fixed Dec. 2003, no failures since (knock knock)
  - Spare modules for all voltages
  - New L1Muon load
    - Test all voltages and PS readout and control (via teststand RM)

Updates

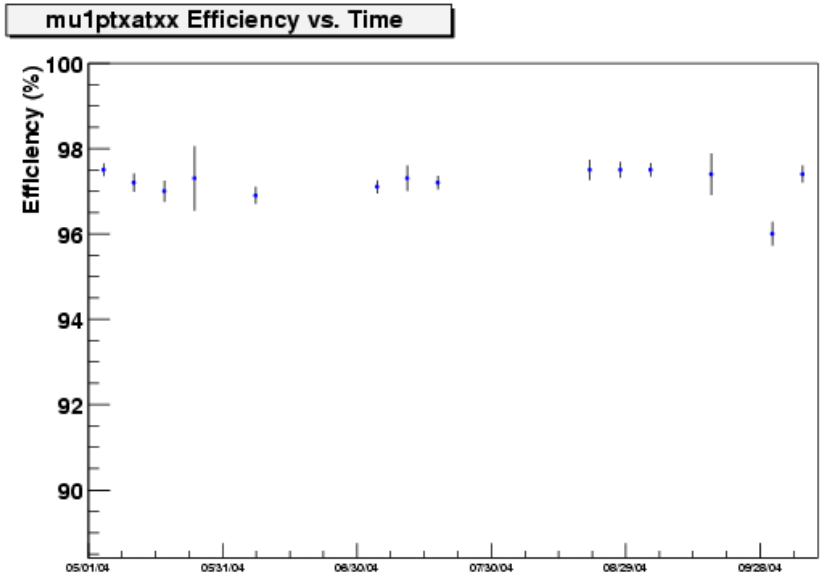
- Firmware
  - Added tight wire triggers in central and forward
  - Optimized scintillator roads in central bottom
    - Add tight and loose count-to-2
    - Fix bug in tight CFT.scint trigger in octant 6
  - Expand 'wide' region to $|\eta| < 1.6$
- Simulator
  - Add forward tight wire triggers, central in 1 month
  - All scint roads .rcp-based (including new central bottom)
  - Online hourly plots stored for a week

Monitoring and Download

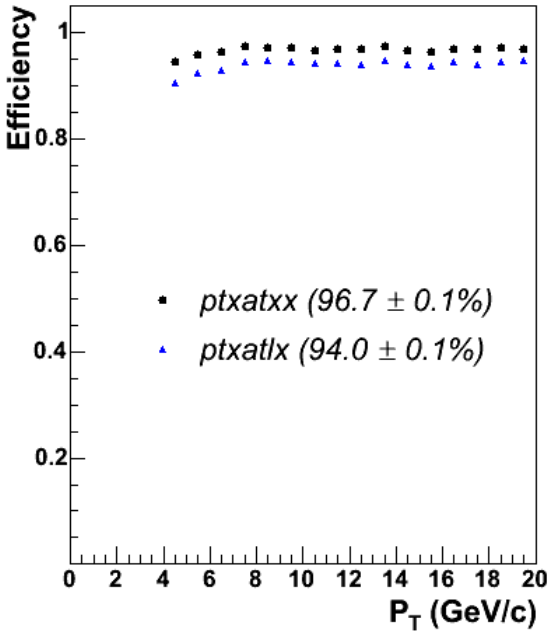
- Moved to direct ethernet-based monitoring of crates
  - 1553 monitoring and download verification prone to 'stale data' problem
  - Monitor any VME address directly from 68040 via EPICS
- GUI monitors lock, FIFO full, and parity error registers
- Coor download of trigger managers through same path
  - Dynamic downloading tested for all trigger managers

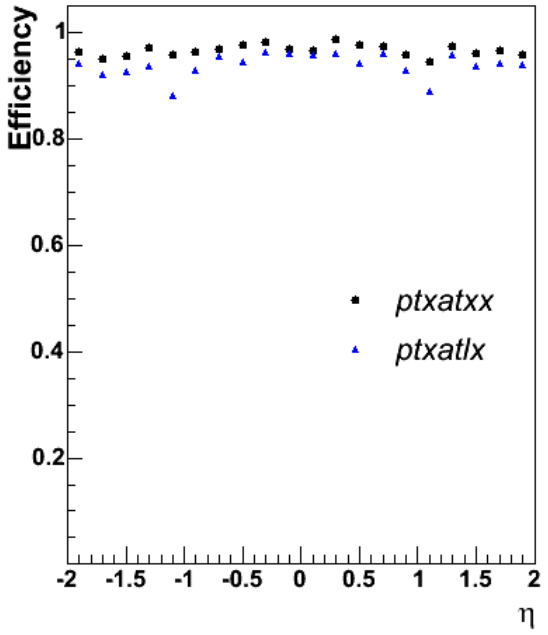
Trigger Efficiencies

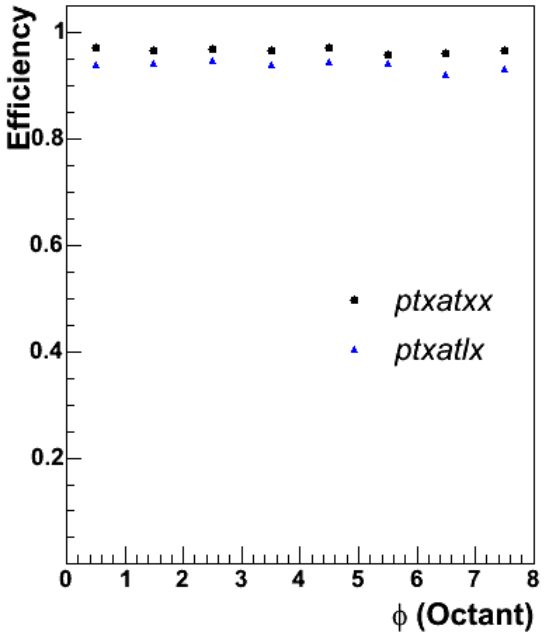
- Monitored weekly from data skims
- Plotted for scintillator, wire, and CFT
  - Use events from jet and EM triggers (unbiased)
  - Denominator is medium muons AND BC scint requirement, num is denom.L1 trigger
- Part of weekly L1Muon expert checklist
- Available on web



Trigger Efficiencies







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Crate Monitoring GUI